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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,715	03/15/2004	Toyokazu Fujii	60188-756	8984

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McDermott, Will & Emery
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

PHAM, THANHHA S

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/799,715

Applicant(s)

FUJII ET AL.

Examiner

Thanhha Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/018,181.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 03/15/2004
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

This Office Action is in response to Applicant's Supplemental Amendment dated 09/23/2004.

Oath/Declaration

1. Oath/Declaration filed on 03/15/2004 has been considered.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

4. Claim 46 and 61 are objected to because of informalities. Appropriate corrections are needed to clarify the scope of the claims.

► With respect to claim 46,

line 2, "pull stress for said silicon oxide" should be changed to "pull stress for said insulating" to clarify the scope of the claim.

► With respect to claim 61,

line 5, "silicon oxide" should be changed to "insulating" to clarify the scope of the claim.

line 6, "a second region of said silicon oxide film in contact with" should be changed to "a silicon oxide film in contact with a second region of" for clarifying the scope of the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 34-46, 48-59 and 61-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Fazan et al. [U.S. Pat. 5,597,756].

► With respect to claim 34, Fazan et al. (fig. 2, cols. 3-4) discloses a semiconductor device comprising:

a substrate (12, col. 3 lines 36-43) having a semiconductor region;

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an insulating film (16, col. 3 lines 43-49 and col. 4 lines 9-11) formed on said semiconductor region, said insulating film (16) including impurities;

an interconnection (18B, col. 3 lines 46-49) in contact with a first region of said insulating film (16);

a silicon oxide film (21, col. 3 lines 61-63) in contact with a second region of said insulating film;

a silicon nitride film (22, col. 3 lines 63-64) formed on said silicon oxide film (21).

► With respect to claims 35-37, Fazan et al. (fig. 2, col. 4 lines 9-11) discloses that the insulating film (16) includes boron and phosphorus, wherein the insulating film (16) has a property of reflowing due to a heat treatment under predetermined conditions.

► With respect to claims 38-39, Fazan et al. (fig. 2, col. 3 lines 54-58) discloses that the surface of the insulating film (16) is planarized.

► With respect to claims 40-41, Fazan et al. (fig. 2, col. 3 lines 54-58) discloses that wherein substantially the entire lower surface of said silicon nitride film (22) is in contact with an upper surface of said silicon oxide film (21).

► With respect to claim 42, Fazan et al. (fig. 2) discloses that a part of the silicon oxide film (21) formed over the interconnection (18B); and a part of silicon nitride film (22) formed on said silicon oxide film (21).

► With respect to claim 43, Fazan et al. (fig. 2, cols. 3-4) discloses a semiconductor device comprising:

a substrate (12, col. 3 lines 36-43) having a semiconductor region;

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an insulating film (16, col. 3 lines 43-49 and col. 4 lines 9-11) formed on said semiconductor region, said insulating film (16) including phosphorus;

an interconnection (18B, col. 3 lines 46-49) in contact with a first region of said insulating film (16);

a silicon oxide film (21, col. 3 lines 61-63) in contact with a second region of said insulating film;

a silicon nitride film (22, col. 3 lines 63-64) formed on said silicon oxide film (21).

► With respect to claim 44, Fazan et al. (fig. 2, col. 3 lines 63-67) discloses that an upper insulating film (25) including impurities is formed on the silicon nitride film (22).

► With respect to claim 45, Fazan et al. (fig. 2, col. 3 lines 66-67) discloses that a surface of the upper insulating film (25) is planarized.

► With respect to claim 46, Fazan et al. (fig. 2, col. 4 lines 6-10) discloses that the silicon oxide film (21) provides pull stress for said insulating film (16).

► With respect to claim 48, Fazan et al. (fig. 2, col. 3 lines 40-45) discloses that a gate electrode (13) is formed over the semiconductor region and the insulating film (16) is formed over the gate electrode (13).

► With respect to claim 49, Fazan et al. (fig. 2, cols. 3-4) discloses a semiconductor device comprising:

a substrate (12, col. 3 lines 36-43) having a semiconductor region;

a gate electrode (13, col. 3 lines 40-45) is formed over the semiconductor region;

an insulating film (16, col. 3 lines 43-49 and col. 4 lines 9-11) formed on said semiconductor region, said insulating film (16) including impurities;

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a silicon oxide film (21, col. 3 lines 59-63) formed on the insulating film (16);

a silicon nitride film (22, col. 3 lines 63-64) formed on said silicon oxide film (21);

and

wherein the insulating film (16) is formed over the gate electrode (13) (col. 3 lines 40-45).

► With respect to claims 50-52, Fazan et al. (fig. 2, col. 4 lines 9-11) discloses that the insulating film (16) includes boron and phosphorus, wherein the insulating film (16) has a property of reflowing due to a heat treatment under predetermined conditions.

► With respect to claims 53-54, Fazan et al. (fig. 2, col. 3 lines 54-58) discloses that the surface of the insulating film (16) is planarized.

► With respect to claims 55-56, Fazan et al. (fig. 2, col. 3 lines 54-58) discloses that wherein substantially the entire lower surface of said silicon nitride film (22) is in contact with an upper surface of said silicon oxide film (21).

► With respect to claim 57, Fazan et al. (fig. 2, col. 3 lines 63-67) discloses that an upper insulating film (25) including impurities is formed on the silicon nitride film (22).

► With respect to claim 58, Fazan et al. (fig. 2) discloses that a surface of the upper insulating film (25) is planarized.

► With respect to claim 59, Fazan et al. (fig. 2, col. 4 lines 6-10) discloses that the silicon oxide film (21) provides pull stress for said insulating film (16).

► With respect to claim 61, Fazan et al. (fig. 2, cols. 3-4) discloses a semiconductor device comprising:

a substrate (12, col. 3 lines 36-43) having a semiconductor region;

an insulating film (16, col. 3 lines 43-49 and col. 4 lines 9-11) formed on said semiconductor region, said insulating film (16) including impurities;

an interconnection (18B, col. 3 lines 46-49) in contact with a first region of said insulating film (16);

a silicon oxide film (21, col. 3 lines 61-63) in contact with a second region of said insulating film;

a silicon nitride film (22, col. 3 lines 63-64) formed on said silicon oxide film (21).

► With respect to claim 62, Fazan et al. (fig. 2) discloses that the first region of the insulating film (16) extends along a vertical side wall of the interconnection (18B).

► With respect to claims 63- 64, Fazan et al. (fig. 2, col. 4 lines 9-11) discloses that the insulating film (16) includes boron and phosphorus.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 47 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fazan et al. [U.S. Pat. 5,597,756] in view of Douglas [U.S. Pat. 4,807,016].

Fazan et al. substantially discloses all the limitation as claimed above except teaching that the insulating film (16) includes phosphorus which concentration is 3.0 wt% or more. However, Douglas discloses that the insulating film (BPSG) typically

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includes approximately 1 to 10 by weight of phosphorus in their chemical formula (see col. 1, lines 39-43). The concentration range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Therefore, at the time of invention, it would have been obvious to the skilled in the art, in view of Douglas, to use the insulating film including concentration of 3.0% or more in the semiconductor device of Fazan et al. to provide isolation function as desired in the semiconductor device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Thanhha Pham', with a stylized flourish at the end.

Thanhha Pham
Patent Examiner
Patent Examining Group 2800